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By

John W. McDavid

*Iowa Child Welfare Research Station*

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IMITATIVE BEHAVIOR IN PRESCHOOL CHILDREN<sup>1</sup>

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THE CONCEPT of imitation is of direct interest to psychologists in several areas. Behavior which is patterned after a model set by some external figure constitutes a notable portion of human activity and operates as a critical mechanism in certain complex behavior. The phenomenon of social learning, possible in the human organism because of elaborate skills of communication, enables man to profit by observation of others around him and thus to short-circuit the long and tedious process of learning only through direct experience. This mechanism, especially in early childhood development, often derives from imitation. An older or more experienced person frequently serves as a guide for behavior before the imitating organism can "read" environmental cues for himself and behave independently in response to those cues. In later stages, the behavior of others serves to expose the imitator or direct his attention to relevant environmental cues.<sup>1</sup>

Miller and Dollard (1941) have proposed an analysis of imitation and social learning by synthesizing elements of Hullian learning theory with empirical observations of human social behavior. A series of experimental laboratory studies, using both animals and children, served initially to document their theoretical analysis. Several more recent experiments (Church, 1957; Schein, 1954; Solomon & Coles, 1954; Wilson, 1958) have further explored the implications of their basic hypotheses.

The present study is designed to explore, within a framework comparable to that em-

ployed by Miller and Dollard, some potential sources of interindividual variance in the experimental learning of imitative behavior. In laboratory studies which assume all subjects to be equal and identical at the beginning of experimental manipulation, there is a certain component of variance ordinarily included in the error term which may be isolated as *personality variance*. The term applies to those variables which operate prior to experimentation to make subjects, in spite of traditional assumptions, *not* equal and *not* identical. Variables of this type may be conveniently categorized as (a) genetic or given biographical factors (e.g., age, sex, etc.) or (b) experiential factors or learned systems of habits (e.g., prior experienced exposure or specification of conditions). This research proposes to deal with both categories as sources of potential individual differences in behavior in the laboratory. The scope of the research reported here is broad, and the techniques utilized cover a wide range methodologically. The basic experiment may be considered a replication of the primary Miller and Dollard experiment on the learning of imitative behavior in young children (Miller & Dollard, 1941: Experiment V). These data, however, then constitute the basis for extended exploration of several factors: (a) biographical factors (age, sex of subject, and sex of leader), (b) intellectual factors (Binet IQ scores), (c) experiential variables (child rearing antecedents), (d) conditions of family structure (ordinal position in the family), and (e) tangential variables of social behavior which may gauge the generality of the imitative tendency over a wider area of behavior (observed dependency in play activity).

Although the data reported here are in many cases consistent with and supportive

<sup>1</sup> The author is indebted to David H. Crowell for handling the administration of the Parental Practices Research Scale, to Ruth Updegraff, Rosalind Gold, and Nancy Mann for making available data from uncompleted M. A. research, and to June Naumann for her assistance as an experimenter and experimental leader.

of research findings which have utilized gross and inclusive definitions of similar concepts (e.g., "dependency," "parental restrictiveness," or "social learning"), this study cannot serve as the basis for unguarded generalizations about gross variables of parent behavior, child behavior, or relationships between these. Certain of the concepts defined here may well be restricted to the particular operations of measurement or observation employed. A child who imitates adults as observed here may give evidence of some general characteristics in his day-to-day behavior, but one cannot conclude from the brief observation of a particular child in the laboratory that he is a "dependent" child as a teacher or another researcher might characterize him. The intent of this report is to describe a set of observations of a nature lacking in reported studies of imitation, both in terms of (a) individual differences in performance in the laboratory and (b) relationships between child rearing antecedents and observed imitative behavior in young children.

#### THE BASIC EXPERIMENT

This study is intended to explore individual differences in the process of acquiring an "imitation habit." *Imitation* is defined as behavior which is patterned after a model or example provided by another organism. In contrast to "copying behavior," which Miller and Dollard (1941) define as a case of progressive modification of a complex response until it attains a particular criterion of identity to a model, the imitative behavior observed here is parallel to their definition of "matched dependent behavior," which they describe as a case in which the leader is able to "read" and to respond appropriately to relevant environmental cues while the follower is not. The responses are simple, and the follower depends upon the leader for a signal as to the behavioral act (already in his behavioral repertory) which is to be performed. Thus the concept of *social cue* arises. While the leader in this paradigm may be said to respond to an environmental cue (color, position, etc.), the follower responds to a social cue (the be-

havioral act of the leader) in determining his response. In function there is no difference, other than one of convenient categorization, between so-called environmental cues and social cues. A social cue, however, may be dealt with by the follower in two ways: it can either be handled as an end in itself (in which case no independent learning, in the sense of relating a behavioral response to a set of environmental stimulus conditions, occurs) or it may be handled as a means or instrument to an end of social learning (in which case the follower, after responding initially to the leader's act as a cue, eventually comes to "read" independently the same environmental cue to which the leader is responding and to behave independently under such conditions). Experimental studies with both animals (Church, 1957) and children (Miller & Dollard, 1941: Experiment X) have demonstrated transmission of learned behavior by means of social learning (the latter use of social cues described above). The experimental design employed here, however, like the initial Miller and Dollard experiments, precludes the occurrence of such social learning. These designs represent a limiting case in which the cues "read" by the leader are unavailable to the dependent subject. The individual disposed to the latter use of social cues should in these experiments suffer certain interference effects in learning the imitation habit, since in all cases the leader's response conveys invalid and useless information about the environmental cues which are present.

The basic laboratory study here involved a training series in which an experimental subject (the follower or dependent subject) was taught to imitate, that is, to make the same choice in a two-choice discrimination learning problem made by an adult (the leader) immediately preceding the subject. This tendency to make the same behavioral response made by the leader is referred to as the imitation habit. The experimental design parallels that of Miller and Dollard with two major exceptions. First, the follower was unable to observe whether the leader did or did not receive a reward for

his choice in the problem. There were two reasons for introducing this departure. Such a procedure eliminates the "100% successful" prestige value which accrues upon observation of a consistently rewarded leader, thus increasing the latitude of individual differences in learning to imitate which should hypothetically relate to personality differences among the dependent subjects. In addition, the possibility of a higher order complex conceptual solution is eliminated. In the Miller and Dollard design, the experimenter is unable to state unequivocally that the dependent subject is rewarded for the act of imitation *per se*. Although in the animal studies (Church, 1957; Solomon & Coles, 1954) the rat may be assumed to be unable to observe whether the leader did or did not find food, in the experiments with children (Miller & Dollard, 1941: Experiment V; Wilson, 1958), the follower was aware of the consistent success of the leader. Under such conditions, it is conceivable that the follower, having had some experience with hiding-and-finding games, might derive a conceptual solution in learning to imitate, such as "Where the leader looks, there is where the experimenter is hiding the candy," or, in the case of learning to nonimitate, "If the leader found the candy, there is not likely to be any more left in that box." There is some evidence in the Miller and Dollard experiments that the second hypothesis may occur frequently, since they observed in first-trial behavior a preponderant disposition (77% of all responses) to respond in the fashion opposite to the leader's response. The concealment of success or failure of the leader from the follower should thus serve both to eliminate the possibility of such conceptual solutions and to emphasize individual differences in acquiring the imitative habit.

A second departure in design from the Miller and Dollard experiments involved the introduction of imposing color cues as irrelevant environmental cues. If the follower (for whatever reasons) is disposed to attend to environmental cues or to attend to the content of the information obtained

in the observed leader's response, these irrelevant color cues should serve to interfere and retard the course of acquisition of the imitative habit. On the contrary, if the follower is disposed to attend to adults as cues for his behavior without regard to the informational content of their behavior, the irrelevant cues should have no effect upon learning the imitative habit.

In addition, while Miller and Dollard studied the imitative behavior of young children with both peer and adult leaders, this study is concerned only with the imitation of adult leaders.

### Method

#### Subjects

Experimental *Ss* for this study were 32 children between the ages of 45 and 67 mo., with a mean age of 54.6 mo. All *Ss* were enrolled in the Iowa Child Welfare Research Station laboratory preschools, and had without exception previously participated as *Ss* in other experimental studies. For the most part, this population derives from upper middle-class parents of professional standing who are relatively permanent residents of the community.

The experimental leaders were adults in their late twenties with whom the experimental *Ss* were familiar by sight. In no case had a leader previously served as experimenter with any given *S*, nor had a leader ever been associated with a given *S* as a teacher.

#### Apparatus

The apparatus employed here was rather more complex than that of Miller and Dollard. In order to conceal from *S* information as to whether the leader was or was not rewarded, it was necessary to arrange some manner in which *S* could be informed of the leader's response without being informed of its consequences.

The problem box consisted of a small black wooden box containing two compartments (8" × 8" × 6") whose front openings were covered by light wooden panels hinged at the top. The panel on one compartment was bright yellow and the other bright blue. On top of the problem box were two colored light bulbs, one above each compartment and of the color corresponding to the compartment door. The apparatus was arranged so that upon *S's* response, the appropriate light was illuminated to record the choice made. The box was constructed with hinged panels on both the front and back of each compartment, allowing *E* to reverse the box and counterbalance for the position in which each color was presented. The problem box



was placed on a low table at one end of a long rectangular room and, at the opposite end of the room (some 15 ft. removed from the problem box and isolated behind a wooden screen 5 ft. high and 6 ft. wide), two low chairs were placed facing a similar low table containing the report box. This consisted of a wooden box identical in every respect to the problem box, except that the colored door panels were not hinged. Lights above each compartment reported information in the same manner concerning the choice made at the problem box.

The reward for making the appropriate choice in responding was a single small candy-covered chocolate pellet which *S* was informed he could either eat immediately or save in a small sack provided by *E*. The candy was placed by *E* in a small round hollow in the center of the appropriate compartment on each trial.

### Procedure

The experimental training session consisted of 24 trials. Half the *Ss* were run in imitation of a female (in which case *E* was a male) and the other half in imitation of a male leader (in which case *E* was a female). The following instructions were read to *S* and the leader by *E*:

*S* (subject's name), I would like for you to play a little game with *L* (leader's name) and me. You see, this little box (pointing to problem box) has two doors, a blue one and a yellow one. I'm going to hide a candy behind one of these doors, and I want you to guess which door it is behind. All you have to do is reach into whichever door you think the candy is behind and see if it is there. See? (*E* demonstrates that doors are hinged and shows *S* where candy is placed.) If you reach into the yellow door, then this little yellow light comes on (demonstrates) and if you reach into the blue door, this blue light comes on. If you like you may eat your candy when you find it. Or if you prefer, I will give you a sack to save it in. Which would you rather do, *L*? (*L* always chooses to eat candy immediately.) Which would you like to do, *S*?

Now we're going to play the game like this: you will take turns looking for the candy. First *L* will get a turn, and then you will get a turn, *S*. Come over here and I will show you where to sit between turns while we are playing. (*E* directs *S* and *L* to chairs at opposite end of room.) You will sit on these chairs, and when it is *L*'s turn, I will call him (her); and when it is your turn, *S*, I will call you. There is a little box here just like the one I showed you where I am going to hide the candy. (*E* points to report box.) Only this one is just make-believe; it doesn't have real doors. Now you watch this box while *L* takes his (her) turn, and he (she) will watch it while you take your turn. It is fixed so that you can tell which box the other

person looked into. If the little light on this side (pointing to yellow bulb) comes on, that means *L* thought the candy was behind the yellow door and reached in there. And if the little light over here (pointing to blue bulb) comes on, that means he (she) reached into the blue door. *L*, you will do the same thing while *S* takes his (her) turn, so you will know where he (she) thought the candy was. After you have taken your turn, you will go back and sit down and watch this box while the other person goes to take his turn. But don't ever tell each other whether or not you found the candy; that is a secret until the game is over.

Do you understand how to play the game? O.K., now you sit here and I will go hide the candy and I'll call you when I am ready. (*E* returns to problem box.)

O.K., *L*. You come and take your first turn. (*L* takes Trial #1.)

O.K. Now, *S*, you come and take your turn. (*S* takes Trial #1.)

In pretesting, one practice trial was given each *S* before the beginning of the game, but this procedure was found to be unnecessary. The verbal instructions, although intricate, seemed adequate for explanation of the procedure.

*S* was 100% rewarded for imitation of the leader's response. The irrelevant color cues and position cues were counterbalanced to be 50% reinforced in a random order, such that in any block of four trials, *L* chose blue twice and yellow twice, each color once on the right and once on the left. The experimental session consisted of 24 trials (six blocks of four trials) in which *S* was preceded by the adult leader. Although approximately 44% of the *Ss* had not yet learned the imitative solution to the problem during this time, it was discovered in pretesting that extension of the training series beyond this level was not likely to provide additional reliable data. In general, the problem was a relatively difficult one for preschoolers. Although motivation was fairly high at the outset, *Ss* who reached Trial #20 with no more than chance success gave clear evidence of frustration and reduced interest in the task. It is quite possible that increased incentive could have been employed to counteract this. *Ss* employed here had had some experience participating in various discrimination learning studies in which they are customarily rewarded with a relatively highly desired toy. The use of small amounts of candy as the sole reward obviously functioned less effectively as an incentive to sustained effort to solve the problem. Furthermore, the 24-trial training series required approximately 25 min., which approaches the child's tolerance limits for removal from preschool play.

For *Ss* who never learned the imitative solution, the experimental series consisted of 24 trials followed by a termination trial; however, for *Ss* who learned to imitate quickly, the series was abbreviated. The criterion for cessation of training was five consecutive rewarded (imitative) responses,

following which a termination trial was added. The termination trial in all cases consisted of hiding candy in both compartments so that *S* was rewarded on his final trial regardless of his choice.

Although it was initially planned that the study would employ some 60 children, the fact that the experimental problem was relatively difficult greatly reduced the number of available *Ss*. Pre-testing indicated that children aged less than 42 mo. had considerable difficulty with the task. Of four pretest *Ss* younger than this, three were unable to complete more than three trials before it became evident that they were either unable to comprehend and follow the instructions or unable to understand and utilize the information conveyed by the report box. For this reason, all *Ss* aged less than 45 mo. were eliminated, reducing the total sample to 32 *Ss*. In two cases, experimental irregularities made it necessary to replace *Ss*: one *S* choked while eating his candy reward, and a second *S* momentarily lost interest in the problem and asked *E* to hold him on his lap.

The 32 *Ss* were divided into equal subgroups on the basis of (a) sex, (b) age, split at the median of 56 mo., and (c) sex of leader to be imitated. Hence there were four *Ss* in each of eight subgroups. For purposes of abbreviation, these subgroups are referred to by a three-letter code: the first letter denoting sex of *S*; the second, age of *S*; and the third, sex of leader. The subgroups, then, were: FYM, FYF, FOM, FOF, MYM, MYF, MOM, MOF.

Only one experimental observation was recorded on each trial: the occurrence of an imitative (rewarded) response. From these observations, three experimental measures were derived: (a) initial tendency to imitate, or the occurrence of an imitative response on Trial #1; (b) total imitative responses; and (c) deviation from chance imitation. Because the data were handled in blocks of four trials (each block containing counterbalanced color and position cues), *S* could score from 0 to 4 imitative responses within any given block. In the case of those *Ss* who attained a criterion of five consecutive imitative responses prior to completion of all 24 trials, training was discontinued and the number of imitative responses was projected over 24 trials under the assumption that *S* would have continued to make consistent imitative responses had his training been continued. Therefore the imitation score (b) could range from 0 to 4 on any given trial block, or the total imitation score could range from 0 to 24. The deviation from chance imitation score (c) was derived on the basis of the assumption that chance would result in *Ss* making two imitative responses out of a block of four trials. The problem afforded only two alternative responses, and both color and position cues coincided twice with the leader's response in any given trial block. Thus the deviation from chance imitation score was calculated by recording the absolute difference between the number of imitative responses made by *S* in a trial block and the

value 2. These scores could range from 0 to 2 within a trial block, and total scores could range from 0 to 12. While the total imitative responses measure (b) is a meaningful index of the tendency to imitate an adult's behavior, it does not clearly reflect the process of acquiring the imitative habit. The hypothetical *S* who at the outset of training attends to the leader's response as a cue for his own behavior, but begins by making the opposite response and later shifts to the appropriate imitative response, would over the entire training series obtain a total imitation score not differentiable from that of a second hypothetical *S* who disregards the leader's response as a cue and continues for 24 trials to respond at chance level. The deviation from chance imitation score does, however, reflect such differences. The first hypothetical *S* described above should obtain a considerably higher deviation from chance score than the second *S*. It follows then that where the tendency to imitate directly is of focal interest, the total imitative responses score (b) is appropriate; on the contrary, where the tendency to attend to the leader's response as a cue for behavior is of focal interest, the total deviation from chance imitation score (c) is appropriate. Because these two measures are derived from the same basic data, they are related. The correlation coefficient of only .58 between the two sets of scores indicates, however, that they are somewhat different measures.

An additional possible measure of the rate of acquisition of the imitative habit, the trials to criterion measure, proved useless. The number of trials required to meet the predetermined criterion ranged from 7 for 3 *Ss* to infinity (never attained criterion during the training sequence) for 13 *Ss*. Because training was discontinued before learning was complete for over 40% of the *Ss*, an artificial ceiling was placed on the trials to criterion measure, and it therefore was not regarded in analyzing the data.

### Results and Discussion

Table 1 summarizes the behavioral measures for each subgroup in the basic design: (a) behavior on Trial #1; (b) mean total number of imitative responses; and (c) mean total deviation from chance imitation.

#### Behavior on the Initial Trial

The findings with respect to imitation on the initial trial of task corroborate Miller and Dollard's observation of a preponderant tendency toward nonimitation. Of the 32 *Ss*, 9 imitated the leader on the first trial, a percentage proportion of 28.1% as compared with 22.5% in the Miller and Dollard experiment (Miller & Dollard, 1941: Ex-

TABLE 1  
BEHAVIORAL MEASURES ACCORDING TO SUBGROUPS  
IN THE BASIC EXPERIMENTAL DESIGN

Subgroup <sup>a</sup> ( <i>n</i> = 4)	Measure		
	Number of Imitative Responses on Trial 1	Imitative Responses (Mean)	Deviation from Chance Imitation (Mean)
FYM	0	11.75	6.75
FOM	3	20.25	9.25
FYF	0	11.75	7.25
FOF	1	12.25	8.25
MYM	2	17.50	7.50
MOM	1	13.50	5.50
MYF	1	17.25	6.75
MOF	1	9.75	6.75
Total sample	9	14.25	7.25

<sup>a</sup> See text for code labels for subgroups.

periment V). In spite of the steps taken in this experiment to conceal from the follower information about the leader's reward, the initial predisposition of *Ss* to make a nonimitative response in situations of this type nevertheless occurred. A non-parametric analysis of the data revealed no significant differences among the eight subgroups. Furthermore, collapsed combinations of subgroups across the major experimental variables yielded only one significant difference in initial imitative tendency. Older females tended to make significantly more initial imitative responses than younger females, a difference which was significant at the .05 level of confidence by the Fisher exact test.

#### Total Imitative Responses

The two quantitative experimental measures, total imitative responses (*b*) and total deviation from chance imitation (*c*), were each subjected to a mixed analysis of variance, with sex of *S*, age of *S*, and sex of leader constituting the "between" effects, and trial blocks constituting a "within" effect.

The data summarizing the occurrence of imitative responses yielded total scores ranging from 0 to 24, divisible into six blocks of four trials, numbered for convenience Blocks I through VI. The differences among the six blocks were significant at the .001 level of confidence (see Table 2), indicating that learning of the imitative response occurred over the training series. This then constitutes a replication of the Miller and Dollard experiment. The sharpest increase in amount of imitation occurred between Blocks II (Trials 5-8) and III (Trials 9-12), the *t* ratio of 2.617 ( $p < .02$ ) indicating the only significant difference between adjacent trial blocks. That the major portion of learning occurred between Blocks I and IV is indicated by the fact that while both the differences between I and IV ( $p < .01$ ) and between Blocks I and VI ( $p < .01$ ) are significant, the differences between Blocks IV and VI is not signifi-

TABLE 2  
SUMMARY OF THE ANALYSIS OF VARIANCE OF TOTAL  
IMITATIVE RESPONSES

Variable	<i>df</i>	<i>ms</i>	<i>F</i>
Between <i>Ss</i> :			
Sex	1	0.33	— <sup>a</sup>
Age	1	0.52	—
Leader Sex	1	12.00	2.00
Sex × Age	1	35.03	5.84*
Sex × Leader Sex	1	1.34	—
Age × Leader Sex	1	11.02	1.84
Sex × Age × Leader Sex	1	1.68	—
Between error	24	6.00	
Within <i>Ss</i> :			
Trials	5	6.66	7.30**
Sex × Trials	5	0.35	—
Age × Trials	5	0.66	—
Leader Sex × Trials	5	0.59	—
Sex × Age × Trials	5	0.40	—
Sex × Leader Sex × Trials	5	0.52	—
Age × Leader Sex × Trials	5	0.73	—
Sex × Age × Leader Sex × Trials	5	0.40	—
Within error	120	0.91	

\*  $p < .05$ .

\*\*  $p < .01$ .

<sup>a</sup> *F* ratio less than unity.



cant. These data suggest that if an *S* is likely to learn the imitative habit in this paradigm, he is likely to make the greatest gains in potential prior to the sixteenth training trial.

None of the simple effects (age of *S*, sex of *S*, sex of leader) showed significant effects on total imitative behavior. Although one might expect certain general differences in a tendency toward matched dependent behavior between older and younger *Ss*, these data provide no evidence of such differences. For purposes of interest, however, it might be noted that there was a slight (but insignificant— $p$  between .10 and .20) tendency for all *Ss* to imitate the male leader more than the female leader. Inspection of the data suggests that this differential tendency is greater among older *Ss* than among younger *Ss*. Although such differences would be interesting in connection with study of the progressive differentiation of adult sex types and identification, these data warrant no conclusion. Since it is possible that this insignificant trend may be an artifact peculiar to the individual male and female leaders employed in this study, these effects merit further experimental attention.

The interaction between sex of *S* and age of *S* significantly affected the total imitation score ( $p < .025$ ). Within the sample of male *Ss*, the mean imitation score for younger *Ss* ( $MY = 17.38$ ) was significantly greater than for older *Ss* ( $MO = 11.63$ ). On the other hand, within the sample of female *Ss*, this mean for the younger *Ss* ( $FY = 11.75$ ) was significantly smaller than for the older *Ss* ( $FO = 16.25$ ). These differences, significant by  $t$  test at beyond the .01 confidence level, would seem consistent with the general assumption that males, in their early training, are progressively taught to adopt a more independent role in behavior, while females are taught to adopt a more reticent, submissive, dependent role. Among the older *Ss*, the females imitated significantly more often than the males ( $p < .01$ ); however, it is surprising that these sex differences were significant and in the opposite direction for younger *Ss*.

These observations involve the comparison of subgroups containing eight *Ss*, and although the trend is replicated in the same fashion with both male and female leaders, additional cross-validation is warranted.

The interaction effects of the "between" variables (sex of *S*, age of *S*, sex of leader) with trial blocks indicate the extent of difference among subgroups in the forms of learning curves for acquisition of the imitative habit. None of these interactions were statistically significant.

#### *Deviation from Chance Imitation*

The deviation from chance imitation score is an index not of the tendency to imitate adults, but of the extent to which the adult leader's response appeared to function as a determinant of *S*'s behavior.

The within effect, trial blocks, fell short of the required .05 significance level. Thus, while the data indicate that the imitative response per se can be taught experimentally, the disposition to attend to the

TABLE 3

SUMMARY OF THE ANALYSIS OF VARIANCE OF TOTAL DEVIATION FROM CHANCE IMITATION SCORES

Variable	df	ms	F
Between <i>Ss</i> :			
Sex	1	2.08	1.39
Age	1	0.19	—*
Leader Sex	1	0.00	1.68
Sex $\times$ Age	1	2.52	—
Sex $\times$ Leader Sex	1	0.08	—
Age $\times$ Leader Sex	1	0.02	—
Sex $\times$ Age $\times$ Leader Sex	1	1.02	—
Between error	24	1.50	
Within <i>Ss</i> :			
Trials	5	0.97	2.14
Sex $\times$ Trials	5	0.17	—
Age $\times$ Trials	5	0.30	—
Leader Sex $\times$ Trials	5	1.01	2.23*
Sex $\times$ Age $\times$ Trials	5	0.48	1.07
Sex $\times$ Leader Sex $\times$ Trials	5	0.10	—
Age $\times$ Leader Sex $\times$ Trials	5	0.36	—
Sex $\times$ Age $\times$ Leader Sex $\times$ Trials	5	0.26	—
Within error	120	0.45	

\*  $p < .05$ .

\* F ratio less than unity.

leader's response as a cue for behavior is not effectively learned in such experimental training. The interaction between leader's sex and trial blocks was significant at the .05 level of confidence. This significance is due altogether to that group of Ss trained to imitate a male leader. While none of the differences between trial blocks is significant for Ss trained to imitate a female, the mean differences between Blocks I and IV (0.81 versus 1.25), between Blocks I and V (0.81 versus 1.63), and between Blocks I and VI (0.81 versus 1.56) are significant at or beyond the .02 confidence level by *t* test for Ss trained to imitate male leaders. These findings are interesting when the fact is considered that the most frequent adult "teachers" in the learning experience of young children are females: the mother, the preschool teacher, etc. The deviation from chance imitation score on Block I only for imitation of a female leader (1.38) is significantly greater than for imitation of a male leader (0.81) at the .01 level. This suggests that the disposition to attend to the adult female's response as a social cue is considerably greater at the outset of training. Thus, although the total scores over the entire training series do not differ for Ss trained to imitate males and Ss trained to imitate females, the data indicate that attention to the female's response is likely to have been learned prior to the experimental training, whereas attention to the male's response is fairly effectively learned during the training sequence.

None of the simple between-subjects effects reached significance.

#### IMITATIVE BEHAVIOR AND INTELLIGENCE

The component variables defining intelligence are ill-specified, but in any learning situation there is some likelihood that intellectual factors operate to some extent in determining an individual's performance. For this reason it is imperative that before other variables are explored as potential determinants of imitative behavior, the role of intelligence should be clarified.

It is conceivable that the highly intelligent *S* might in this situation be alert to cues of

all categories (both social and environmental), thus shrewdly "catching on" to the fact that imitative behavior is reinforced and consequently deriving high scores both in terms of total imitative behavior and in terms of deviation from chance imitation. Such an analysis yields an hypothesis of direct relationship between observed imitation and intelligence. On the other hand, it is equally feasible that the highly intelligent *S* might be more likely to attempt to use the leader's behavior as a cue for social learning, directing attention to the environmental cues, and pursuing false leads in attempts to utilize the leader's response as an instrument to solution of the problem on the basis of environmental cues. Such an *S* should suffer greater interference from the randomized color and position cues, leading to slower learning and lower scores both in terms of total imitative behavior and deviation from chance imitation. This analysis yields an hypothesis of inverse relationship between imitation and intelligence.

#### Method

For 26 of the original sample of 32 Ss, Binet intelligence test scores were available. During the course of the academic year, graduate students in a course dealing with the psychological appraisal of young children customarily utilize children in the laboratory preschools as practicum Ss for administration of Form L of the Stanford-Binet tests of intelligence (Terman & Merrill, 1937). When such administrations are found by the instructor to meet requisite standards, the scores are recorded on the permanent file of each preschool child. The scores used in this exploration were derived from this source. The recency of the test scores varies from *S* to *S*, but in no case were scores older than 18 mo.

The mean IQ for the sample of 26 children was 120.9, with scores ranging from 87 to 150. The scores were split at the median (119), providing for a High Intelligence group and a Low Intelligence group. In order to control for the effects of the basic experimental variables observed to affect imitation (sex and age), both subsamples included four younger females, three older females, four younger males, and two older males. There were no systematic relationships between intelligence and age or sex.

The imitative response scores were submitted to a simple mixed analysis of variance with IQ level constituting the between-subjects component and trial blocks constituting the within-subjects component. Since deviation from chance scores did not

vary over trial blocks, the difference between these scores for the two IQ levels was tested by simple *t* test.

### *Results and Discussion*

The analysis of variance of imitation scores indicated no relationship between number of imitative responses and intelligence level. Likewise, the *t* test indicated no difference in total deviation from chance scores for the two intelligence levels. The product-moment correlation between Binet IQ scores and total deviation from chance scores was  $-.11$ , which is not significantly greater than zero. However, the correlation between total imitation scores and Binet IQ scores was  $+.42$ , which is significant at the .05 level of confidence.

These findings suggest that predispositional attention to adult behavior is unrelated to tested intelligence, but that direct imitation of the adult's behavior bears a slight relationship to intelligence. Such a relationship might be expected as a general function of learning ability rather than of tendency to imitate adults. Since the deviation from chance imitation measure is apparently free of intelligence effects, and since total imitation measure, which is more directly a function of learning ability, is only moderately correlated with intelligence, it is unlikely that intellectual factors alone can account for a considerable amount of the observed variance among individuals in imitative behavior.

### CHILD REARING ANTECEDENTS OF IMITATIVE BEHAVIOR

This phase of the experimental study of imitative behavior was directed toward the exploration and analysis of individual differences in behavior under controlled laboratory circumstances as a function of child rearing antecedents. The position adopted in executing these studies assumes that individual differences in the predisposition to behave in an imitative or matched dependent manner arise at least in part from differential patterns of experienced reinforcement in related situations. Inasmuch as the present experimental design assesses the ex-

tent to which a preschool child imitates an adult, one of the most consequential related areas of experience should be that of parent-child interaction, the prototypical situation in which the child learns most of his habits of interaction with adults. It would be expected that the child reared under circumstances in which his blind imitation of adult behavior is consistently rewarded and his devious attempts at independent exploration of the consequences of his own independent behavior punished should be predisposed to a general tendency to follow the behavior of adult figures.

Research findings in this area are largely consistent with such an hypothesis, although the methods of assessment of variables in such research are often imprecise and the variables themselves ill-defined. While certain studies have made use of direct assessment of parental attitudes and practices (Champney, 1941; Radke, 1946; Sears, Whiting, Nowlis, & Sears, 1953; Shoben, 1949), most have utilized case histories (Newell, 1936) and judgmental ratings by the researcher (Baldwin et al., 1945; Knight, 1933; Lasko, 1952) for assessment of the parental variables under investigation. Similarly, while a few studies have utilized controlled observation (Hattwick, 1936; Radke, 1946; Sears et al., 1953), several have used projective assessment (Radke, 1946) and after-the-fact judgmental ratings by observers (Knight, 1933; Lasko, 1952) as techniques for collecting data on child behavior. Radke (1946), in integrating research evidence in this area, has summarized a number of relationships between parental practice variables and child behavior either directly or indirectly relevant to imitation. This summary indicates some consistency among the findings, but also a certain amount of apparent incongruity. Behavior labeled "submissive" has been shown to be related to parental "overprotection" (Grant, 1937; Hattwick, 1936; Newell, 1936) as well as to parental "rejection" (Newell, 1936; Radke, 1946) and "domination" (Radke, 1946; Symonds, 1939). Behavior labeled "non-compliant" has likewise been demonstrated

to relate to "rejection" (Meyers, 1944) and parental "autocracy" (Radke, 1946), as well as to parental "submissiveness" (Meyers, 1944). In addition, behavior defined as "independent" and "self-reliant" has been shown to be related to parental "submissiveness" (Symonds, 1939), to a "logical-scientific approach to child rearing" (Grant, 1937), and to "warm interaction with the child" (Hattwick, 1936). While parental "overprotection" and "rejection" may appear on the surface to be incompatible phenomena, Levy (1943) has proposed a distinction between phenotypic rejective behavior toward the child and genotypic rejective feelings which might lead to compensatory overprotection in overt behavior. Thus, some reconciliation of apparent contradiction among the findings is effected. Nevertheless, without exhaustive analysis of the concrete definition of such variables as "submissiveness," "rejection," and "overprotectiveness" in parents, such research evidence is of doubtful value either to the researcher or to one dealing directly with children.

Hattwick (1936), in a study somewhat comparable to the present investigation, utilized planned and controlled observation of children and of their parents (in home visits) and found that help-seeking behavior in the child is directly related to overprotective practices in the home.

While the present study did not propose the test of explicitly stated hypotheses, it was designed to explore the extent to which previously derived laboratory measures of a predisposition to imitative behavior among preschool children are related to certain variables of parental attitude through the Parental Attitudes Research Instrument (Schaefer & Bell, 1958) and to certain variables of parental practice, through a modification of the Sears, Maccoby, and Levin (1957) maternal interview (Gold, 1958).

### Method

#### Sources of Data

**Parental Attitudes.** The Parental Attitudes Research Instrument (PARI) is an uncopyrighted research instrument devised by Schaefer and Bell

(1958) to assess a number of attitudinal areas focused upon the rearing of children. The instrument itself has been through several modifications by its authors and has been submitted to at least two factor analyses (Schaefer & Bell, 1957; Zuckerman, Ribback, Monashkin, & Norton, 1958). The attitude data utilized here are quantitatively unrefined, in that two slight modifications of Form IV of the PARI were employed in different test contexts. It was nevertheless assumed that the crude measures thus obtained should yield fairly comparable and meaningful scales. The PARI, in one of two forms, was administered to the mothers of 31 of the original 32 experimental Ss, and to the fathers of 29 of these Ss. For two mothers and eight fathers, PARI Form IV was administered alone in the spring of 1957; for the remaining 29 mothers and 21 fathers, PARI Form IV was administered in early 1958 within an experimental test battery devised by Chantiny, Lovell, and McCandless (1956). This battery, in addition to a very slightly reworded modification of PARI Form IV (which made it appropriate for either parent by the substitution of the word *parent* for the words *mother* or *father* wherever they occurred), also contained adaptations of the California F Scale and the Taylor Manifest Anxiety Scale. Each item in the PARI presents a statement of an attitudinal position, and requests the parent to indicate the extent of his agreement in one of four categories: strongly agree (scored 4), mildly agree (scored 3), mildly disagree (scored 2), and strongly disagree (scored 1). Thus, on each subscale of five items, scores ranging from 5 to 20 were recorded. The subscales explored in this research, selected from the total battery included in the PARI, were:

1. Comradeship and Sharing
2. Autonomy of the Child
3. Suppression of Sexuality
4. Avoidance of Communication
5. Encouraging Verbalization
6. Breaking the Will
7. Equalitarianism
8. Deification of the Parent
9. Fostering Dependency
10. Intrusiveness
11. Strictness
12. Suppression of Aggression

The labels given these scales by the authors of the PARI are generally descriptive of their content. The Suppression of Sexuality and Suppression of Aggression scales index permissiveness in the areas of sexual and aggressive behavior. Avoidance of Communication and Encouraging Verbalization are scales which measure the extent to which the parent believes the child's thoughts and opinions should be expressed. The Intrusiveness scale assesses the parent's intrusion upon the child's privacy of thought and activity. The first five scales listed above loaded most heavily on Factor I, Suppression and Interpersonal Distance,

one of five emergent factors in a factor analysis of an early form of the PARI (Schaefer & Bell, 1957). Scores on these scales were summed algebraically, in terms of their direction of loading, to yield a combined Factor I score for each S.

**Maternal Practices.** A second set of data involving maternal child rearing practices was explored similarly. In connection with other ongoing research at the Iowa Child Welfare Research Station, a modification of the Sears et al. (1957) direct maternal interview had been undertaken (Gold, 1958). These data were available for 22 of the original 32 experimental S's. The procedure consisted of a structured interview of approximately 90-min. duration with the mother, executed by two female interviewers by prior appointment at one of the preschool buildings, and recorded with the mother's knowledge for later transcription. The interviewers underwent a preliminary period of training to maximize comparability in interviewing technique, and the transcribed interview was rated on predefined scales by two graduate students. The material included in the interview was adapted directly from the Sears interview, and the rating scales employed were identical. In rating the material, the ratio of rating agreements to total ratings for the two judges was .91. Discrepancies of two or more rating points were discussed to agreement, while discrepancies of one point were simply averaged. All ratings were converted by linear transformation to a standard nine-point scale, and were used in that form in the analysis of these data. The following 19 subscales (identified by the number assigned them by Sears et al.) were studied:

- II-23 Amount of affection interaction with the child
- II-43 Demands for table manners
- II-45 Praise for good behavior at the table (high score-none)
- II-53 Modesty permissiveness
- II-56 Masturbation permissiveness
- II-58 Sex-play permissiveness
- II-61 Standards for neatness-orderliness
- II-62 House and furniture restrictions
- II-66 Noise restrictions
- II-73 Standards for obedience
- III-11 Disapproval of dependency
- III-13 Affectionate demonstrativeness toward the child
- III-14 Time to play with the child (high score-little time)
- III-23 Praise for playing nicely (high score-none)
- III-30 Permissiveness for aggression toward parents
- III-31 Punishment for aggression toward parents
- III-36 Use of tangible rewards
- III-47 Extent of use of deprivation of privileges
- III-57 Extent of use of reasoning

Milton's (1958) factor analysis of the Sears interview material yielded three factors which appear to be descriptive of parent-child interaction patterns. In order to derive a factorial score for each factor, the scores on individual scales which loaded  $\pm .35$  or greater were combined algebraically in terms of their direction of loading. Using this procedure, Factor S (Strictness-permissiveness) includes Scales II-43, II-53, II-56, II-58, II-61, II-62, II-66, III-11, III-30, and III-31. Factor W (Warmth of the mother-child relationship) includes Scales II-23, II-45, III-11, III-13, III-14, and III-57. Factor R (Responsible child rearing orientation) includes Scales II-45, II-61, II-73, III-23, III-36, and III-47.

**Child Behavior.** The measures of child behavior utilized here are derived directly from the laboratory study of imitative behavior. Three measures were analyzed: (a) total imitative responses (number of imitative responses in the 24-trial training series); (b) total deviation from chance imitation (absolute difference between the total number of imitative responses made and the number expected by chance); and (c) initial tendency to imitate (behavior on Trial #1 of the training series). For the first two measures, product-moment coefficients were calculated as indices of the extent of correlation between child behavior and parental attitudes and practices. Although a number of factors lead to the expectation of nonlinear relationships in an analysis of this type, the linear product-moment coefficient is apparently a serviceable index for these data. The statistic epsilon, a derivative of the correlation ratio ( $\epsilon$ ) which is unbiased by sample size and coarseness of grouping (Kelley, 1935) was calculated for each of the relationships explored, and in no case was the hypothesis of linearity of regression negated. Hence the correlation indices reported here are such that if the coefficient is statistically significant, the relationship between the two variables concerned may be assumed to be roughly linear.

In considering the third variable of child behavior, initial tendency to imitate, point-biserial correlation coefficients were calculated, since the criterion variable (imitative first response versus nonimitative first response) is a true dichotomy.

### Results and Discussion

The results of this exploration are not easy to integrate. The predictor variables employed (PARI subscales and interview rating scales) are highly variable measures of broadly defined variables. Furthermore, the criterion variables studied (laboratory behavioral scores) are measures of relatively specific behaviors of the child. The samples are small, and a relatively large coefficient of correlation is required for the



attainment of statistical significance. In view of the large number of correlation coefficients calculated, a certain number of significant relationships are probable, allowing possible Type I statistical errors. Since the study rests upon no explicit predictive hypotheses, only those relationships which proved to be statistically significant are discussed here. The complete table of correlational relationships explored is included as a supplementary appendix. Tables 4 and 5 summarize the empirical relationships which attained statistical significance, and which constitute the basic data for interpretation.

#### *Total Imitative Responses*

One of the criterion measures derived from the laboratory experiment is the total number of imitative responses made (or projected) during the 24-trial training sequence. This measure upon analysis seems to be the derivative of (a) a consistent tendency to emulate the behavior of adults, (b) attention to the adult's response as a determining cue for the child's own behavior, and/or (c) efficient integration of experienced reinforcement in development of the so-called "imitative habit." That is, there are at least three components affecting the magnitude of this score.

*Parental Attitude Measures.* For the female Ss in this study, the total imitative responses measure was related to one maternal attitude measure and two paternal attitude measures. The maternal Suppression of Aggression scale was correlated  $+ .52$  ( $p < .05$ ) with this measure. While the content of these items on the test instrument is directed toward restriction and limitation in a specific area of behavior, the scale probably reflects a somewhat more generalized attitude of strict nonpermissiveness in dealing with children. The paternal administration of the PARI yielded two scales which correlated significantly with total imitation: Avoidance of Communication ( $r = +.53$ ;  $p < .05$ ) and Autonomy of the Child ( $r = -.55$ ;  $p < .05$ ). The former scale contains items which generally suggest rejective denial of the child's initia-

tion of verbal interaction, and the latter is an index of the extent to which independent exploration by the child is approved and fostered.

The prediction of laboratory imitation of boys from parental attitude measures is more ambiguous than for girls. Only one parental attitude scale was significantly related to behavior for the male Ss: the paternal Strictness scale, which correlated  $+ .57$  ( $p < .05$ ) with total imitative responses.

For the total sample (combined males and females), only one parental attitude scale was related to total imitation: the paternal Autonomy of the Child scale correlated  $-.37$  ( $p < .05$ ) with this measure, but the relationship is accounted for largely by the strength of the correlation among females. The correlation between these two measures for males was only  $-.14$ , which is not significantly different from zero.

There are undoubtedly meaningful differences in predictive validity between maternal and paternal child rearing attitudes. The correlations between attitudinal measures for pairs of parents was uniformly low within the present sample. Although one might expect useful information about the identification process to emerge from comparative analysis of the behavior of male and female children with respect to the child rearing attitudes of their mothers and fathers, the present study afforded little opportunity for such exploration.

*Maternal Practices Measures.* The observed relationships between the child's laboratory behavior and child rearing practices reported after-the-fact by the mother were generally consistent with the emergent pattern of relationships between behavior and parental attitudes. The schematic design of the Sears type interview is one which affords relatively more precision in definition of the measured variable than does the PARI, but it is at the same time more open to difficulties of distortion. The interview situation is one in which distortion for interpersonal approval is maximal; furthermore, the intervening process of judgmental rating affords the introduction of "personal



TABLE 4  
CORRELATIONS BETWEEN PARI SCALES AND LABORATORY IMITATION  
(Pearson  $r$ )

PARI Scale	Behavioral Measure					
	Total Imitation			Deviation from Chance Imitation		
	Boys	Girls	Total	Boys	Girls	Total
Maternal PARI						
Suppression of Sexuality	-.19	+.32	+.08	-.13	+.58*	+.17
Suppression of Aggression	-.30	+.52*	+.03	.00	+.57*	+.10
Breaking the Will	-.30	-.21	-.21	-.61*	-.30	-.50
Factor I:						
Suppression and Interpersonal Distance	+.34	-.04	+.10	+.41	-.51	+.04
Paternal PARI						
Autonomy of the Child	-.14	-.55*	-.37	+.28	-.60*	-.12
Avoidance of Communication	-.08	+.53*	+.14	-.18	+.46	-.01
Intrusiveness	+.28	+.10	+.16	+.79**	+.18	+.30
Strictness	+.57*	-.12	+.15	-.19	+.65*	+.13
Factor I:						
Suppression and Interpersonal Distance	+.07	-.50	-.24	+.38	-.45	-.01

\*  $p < .05$ .\*\*  $p < .01$ .

TABLE 5  
CORRELATIONS BETWEEN MATERNAL INTERVIEW SCALES AND LABORATORY IMITATION  
(Pearson  $r$ )

Interview Scale	Behavioral Measure					
	Total Imitation			Deviation from Chance Imitation		
	Boys	Girls	Total	Boys	Girls	Total
Permissiveness for aggression toward parents	+.12	-.81**	-.57**	+.27	-.40	-.11
Punishment for aggression toward parents	-.15	+.68**	+.35	-.60	+.24	-.11
Amount of affectionate interaction with child	.00	+.14	+.06	-.37	+.56*	+.21
Factor S:						
Strictness-permissiveness	-.41	+.75**	+.25	-.53	+.65*	+.04
Factor W:						
Warmth of mother-child relationship	-.05	-.29	-.22	-.14	-.52	-.42
Factor R:						
Responsible child rearing orientation	-.21	-.06	-.12	-.32	-.04	-.21

\*  $p < .05$ .\*\*  $p < .01$ .

equation" errors. Nevertheless, the findings emergent in this exploration appear to be relatively consistent across both instruments.

None of the interview rating scales was significantly related to the laboratory behavior of the male Ss. This fact appears to lend further credence to the assumption that the behavior of young males in situations of this type may be somewhat less amenable to simple analysis than the behavior of young females.

For the subsample of 13 female Ss for whom maternal interview data were available, three individual rating scales and one of the combined factorial scales were correlated with the total number of imitative responses in the laboratory. This score correlated  $-.81$  ( $p < .01$ ) with Scale III-30 (Permissiveness for aggression toward parents) and  $+.68$  ( $p < .01$ ) with Scale III-31 (Punishment for aggression toward parents). These two scales were mutually correlated in Sears' initial sample and are evidently interrelated aspects of parent-child interaction (Sears et al., 1957). While they tap an area concerned with the maintenance of parental authority over the child, they are in all likelihood specific aspects of a more general tendency for the parents to maintain relatively strict control of the child. This interpretation is suggested by the strong loadings of these two scales ( $-.51$  and  $+.43$ ) on Factor S (Permissiveness-strictness) in the Milton factor analysis of the Sears data (Milton, 1958). In line with this interpretation, the Factor S combined score is also correlated with total imitation ( $r = +.75$ ;  $p < .01$ ).

Since the correlations between behavior and interview data for boys were uniformly low, in only one case did the correlation between total imitation and maternal practices attain significance for the combined sample (males and females). Scale III-30 (Permissiveness for aggression toward parents) was correlated  $-.57$  ( $p < .01$ ) with this measure, but the magnitude of this relationship is due to the correlation within the female subsample. The same correlation for males only was  $+.12$ .

#### *Deviation from Chance Imitation*

A second, perhaps less ambiguous, behavioral measure from the laboratory experiment concerned the extent to which the child's behavior appeared to have been determined by the adult leader's response. This score indicates the absolute difference between the number of imitative responses made by the child and the number expected by chance during training. It may be construed as an index of dispositional cue selection; that is, of a general tendency to attend to "social cues" when pitted against direct environmental sensory stimuli as potential determinants of behavior. The fact that this score did not increase significantly over the training series implies that reinforced training had little effect in altering such a dispositional tendency.

*Parental Attitude Measures.* For the females, this social attention measure was significantly related to two maternal and two paternal attitude scales. Correlations of  $-.57$  with the maternal Suppression of Aggression scale and  $+.58$  with the maternal Suppression of Sexuality scale were both significant at the .05 confidence level. While both of these attitudinal scales focus upon specific behavioral areas, they are probably homogeneous in reflecting generalized non-permissiveness in child rearing. The deviation from chance imitation measure also correlated  $+.65$  ( $p < .01$ ) with the paternal Strictness scale, and  $-.60$  ( $p < .05$ ) with the paternal Autonomy of the Child scale.

For the male Ss, two parental attitude scales were correlated with deviation from chance imitation. This measure correlated  $+.79$  ( $p < .01$ ) with the paternal Intrusiveness scale, which contains items describing severe limitation of the child's privacy in thought and behavior. In addition, deviation from chance imitation correlated  $-.61$  ( $p < .05$ ) with the maternal Breaking the Will scale. This scale contains items which describe harsh and punitive control of the child, especially through fear of the parent. While the body of evidence yielded in this exploration suggests that parental strictness may foster dependent attentiveness to adults for behavioral cues, it may be possible that

high scores on the Breaking the Will scale indicate a parental position leading to a generalized distrust of adults by the child. On the surface, this observed relationship appears inconsistent with the remainder of the emergent body of evidence described here; however, this analysis of the attitudinal position described in this particular scale would generate a prediction of independent behavior consistent with the observed relationship as well as with the remainder of the present findings. The corresponding correlation within the female subsample was  $-.30$  (nonsignificant), and the combined sex correlation between deviation from chance imitation and the maternal Breaking the Will scale was  $-.50$  ( $p < .01$ ).

*Maternal Practices Measures.* The extent to which the child's behavior deviated from chance-expected imitation in the laboratory correlated  $+.56$  ( $p < .05$ ) with Interview Scale II-23 (Amount of affectionate interaction with the child) for girls. This scale represents the extent to which the mother reported open affectionate display with her child, and it may possibly be related to general "babying" of the child and attempts to maintain his dependent relationship with his parents. The deviation from chance imitation scores did not correlate significantly with either of the two scales concerned with

aggression toward parents (as did the total imitation score), but correlated  $+.65$  ( $p < .05$ ) with Factor S (Strictness-permissiveness).

#### *Initial Tendency to Imitate Adult Behavior*

While the experimental situation was designed for the training of imitative behavior by consistent reinforcement, the data already discussed provide some evidence that there occur meaningful individual differences in the course of acquiring the learned imitative habit. Aside from training effects, however, the child's initial behavior on the first trial of the experimental series may be construed as a one-shot measure of his initial predisposition to imitate the behavior of adults. Of the 32 experimental Ss, 9 (4 females and 5 males) imitated the response of the adult leader on the first trial. Although this is an ambiguous observation, in that it may be chance determined, it is the only measure in this experiment which is completely free of experimental reinforcement effects. The Ss were split into dichotomous groups on the basis of whether they made the same (imitative) response or the opposite (nonimitative) responses to that of the adult leader on the first choice of the experimental series, and point-biserial correlation coefficients with each of the parental attitude and practice measures were calculated. None of the correlations with parental attitude measures was significant, but this predisposition was correlated  $-.52$  ( $p < .02$ ) with Factor W (Warmth of the mother-child relationship), and  $+.43$  ( $p < .05$ ) with Scale III-11 (Disapproval of dependency) on the maternal interview. While the Factor W score may be characterized as a measure of a warm, democratic, affectionate but not possessive, relationship between the mother and the child, Scale III-11 is perhaps the most direct available measure of the consistency of reinforcement for dependent behavior. Miller and Dollard (1941, p. 121) suggest that the initial tendency to imitate may be largely due to "environmental conditions which have rewarded the (organism) for learning to imitate under conditions similar enough

TABLE 6  
CORRELATIONS BETWEEN INITIAL TRIAL BEHAVIOR  
AND MATERNAL INTERVIEW SCALES  
(Point-biserial  $r$ )

Interview Scale	Correlation with Imitation on Initial Trial
Disapproval of dependency	$+.43^*$
Factor S: Strictness-permissiveness	$+.14$
Factor W: Warmth of mother-child relationship	$-.52^*$
Factor R: Responsible child rearing orientation	$-.42$

\*  $p < .05$ .

to the experimental set-up so that generalization can occur." One would expect, then, that consistent parental reinforcement of dependent behavior should be directly related to imitation on the first trial of this experimental training series. These data, however, indicate the reverse. High scores on Scale III-11 reflect fairly consistent maternal rejection of and punishment for the child's dependent overtures. It is possible that "dependency" as implicitly defined within the context of the interview does not afford a realistic measure of maternal reinforcement for actual matched-dependent behavior; furthermore, it is possible that the present experimental situation may not afford ready generalization from the conditions of maternal reinforcement of dependent behavior. However, the fact that the correlational relationship observed here is significant and in the opposite direction suggests a need for reconsideration and alternative analysis of the effects of consistent parental rejection of the child's dependency. It may be that Scale III-11 measures a specific manifestation of general parental punitiveness, in which case the measured variable may be closely related to other measures of nonpermissiveness in such areas as aggression and sexual behavior. On the other hand, it is possible, as Sears has suggested (Sears et al., 1953, 1957), that conflict in the area of dependency is a major issue in the social development of children. Consistent parental rejection of and punishment for dependent behavior may lead to a false and unrealistic kind of independence on the child's part. Such "forced independence" may lack elements of confidence and self-assurance that are vital to mature independence. It is interesting to note that scores on Factor R (Responsible child rearing orientation), which Sears has tentatively described as a measure of "earnest and responsible" orientation to child rearing duties, the mother's "regard for herself," and devotion of time and effort to administration of "appropriate rewards and punishment in the training process" (Sears et al., 1957, p. 475), are correlated  $-.42$  ( $p = .08$ ) with the child's initial tendency

to imitate. This coefficient is not statistically significant, but its magnitude implies that a reconsideration of such variables in connection with dependency conflict might provide fruitful information.

#### IMITATIVE BEHAVIOR AND THE SIBLING CONSTELLATION

Research concerned with the development of personality and social behavior has rather consistently provided evidence of clear-cut behavioral differences related to the individual's ordinal position among his siblings. Although the methods employed in such studies vary widely, they most frequently make use of behavioral ratings either by the experimenter (Dean, 1947; Goodenough & Leahy, 1927; Lasko, 1954) or by the mother or a teacher dealing directly with the subject population (Kawin, 1934; Koch, 1955). The descriptive pattern which emerges to characterize the oldest child in a family of several siblings appears most consistent from study to study. The oldest child has been described as less aggressive (Cobb, 1943; Goodenough & Leahy, 1927; Kawin, 1934), less self-confident (Cobb, 1943; Goodenough & Leahy, 1927; Koch, 1955), reluctant to make decisions (Dean, 1947), lacking in leadership qualities (Cobb, 1943; Goodenough & Leahy, 1927; Roberts, 1938), and suggestible and gullible (Goodenough & Leahy, 1927). In interpreting these findings, some significance has been attached to the fact that the oldest child occupies the peculiar position of having to give up a once-held "only child" status. Although speculative interpretation has ranged from Adlerian assumptions about the increased press toward aggressive striving in younger siblings (Adler, 1930) to analyses of the different social learning situations encountered by particular ordinal positions (Mussen & Conger, 1956), such discussions are in general concerned most directly with relationships among siblings rather than with differential parent-child relationships which occur as a function of ordinal position. In considering the marked inconsistency of research findings concerning contrasts between the only child and the

child with siblings, Mussen and Conger (1956, p. 343) conclude that "'onliness' itself is not related to any specific type of personality structure or problem behavior. The child's familial background and his relationships with his parents probably influence his personality development much more than the presence or absence of siblings."

The findings described earlier concerning relationships between imitative behavior in the laboratory and parental attitudes and child rearing practices suggest that the parent-child relationship may play a critical role in determining the manner in which a child learns to make use of his observations of the behavior of other people in his own social learning. There was evidence that restrictive, nonpermissive, and autocratic, as well as extremely close, intrusive, and overprotective parental behavior patterns were related to a tendency for the child to utilize social cues as blind directives for behavior rather than as instruments for social learning. It was concluded that such "interventive" practices on the part of parents may in fact tend to restrict the child's independent exploration of his environment and thus increase his reliance upon others for direction. From this, one might speculate that the likelihood for such restrictive interference to occur in a child's early experience may be considerably greater if he is the first-born or only child, but diminished if he is one of several children among whom parental attention must be divided. In addition to the simple realistic division of attention, there may be other factors which lessen the amount of overprotective or intrusive restriction directed by parents toward subsequent children after the first. The birth of the first child into a family is a novel experience for both parents, and usually a much hoped for event. Sears, Maccoby, and Levin (1957) cite evidence that the mother's reaction to pregnancy tends to be significantly more positive with the first child than with later children. Such lessened enthusiasm and eagerness, as well as increased demands on the mother with more than one child, may

differentiate the relationship of a first child to his parents from that of subsequent children. If such assumptions as these are true, they may provide a link of information contributing to the explanation of certain observed behavioral differences related to ordinal position in the family.

While research studies in this area customarily differentiate *only* from *oldest* children (Guilford & Worcester, 1930), the two groups are considered in combination here. Although the pattern of sibling interaction is categorically different in the two cases, there are critical similarities with respect to the particular variables of parent-child interaction with which the present study is directly concerned.

By extending this analysis of parent-child relationships, one might further hypothesize that the greater the chronological separation between a child and his next older sibling, the more that child will resemble an oldest child in terms of the relationship pattern under consideration. A child born into a family at a time when his next older sibling is still in diapers, not yet feeding himself, perhaps not yet toilet trained, and still in many ways requiring a considerable amount of direct attention from the parents, might be expected to receive a relatively smaller amount of protective or restrictive attention from his parents than will the child separated from his next older sibling by a wider span of years. The pattern of parent-child relationships which is assumed to be critical here is likely to be of greatest consequence if practiced at a time when the child's first attempts at independent exploration occur. Such attempts probably begin to be significantly numerous with increased efficiency in locomotion at the end of the first year and early in the second year. They are, of course, likely to continue over a number of years.

#### Method

Ss for this study were the 32 preschool children employed in the basic experimental training of imitative behavior. From permanent biographical records, information concerning the sibling constellation in the home of each *S* was obtained, and the sample was divided into three groups: (1) oldest

and only children ( $n = 9$ ), (II) youngest children ( $n = 13$ ), and (III) middle children or children with both older and younger siblings ( $n = 10$ ). In view of the previously observed effects of age and sex in interaction upon imitative behavior, a balanced distribution within each group with respect to age and sex was achieved, yielding three groups of eight *Ss* each.

The total imitative response scores were subjected to a mixed analysis of variance, with sex of *S* and ordinal position as between-subjects factors and trial blocks as a within-subjects factor. Similarly, the total deviation from chance imitation scores were submitted to a factorial analysis of variance with respect to sex and ordinal position.

The second hypothesis, concerning expected behavioral differences between closely and widely spaced younger siblings, was explored by comparing the total imitation and total deviation from chance scores for these two groups after preliminary analysis of variance had indicated no differential effects over trial blocks. Within the two groups of children having older siblings (II and III), *Ss* were reclassified into two groups on the basis of chronological spacing or the age interval between *S* and his next older sibling. An interval of two and one half years was arbitrarily selected as the cutting point. Children born sooner than 30 mo. after their next older sibling were classified as closely spaced (10 *Ss*), and children born later than 30 mo. after their next older sibling were classified as widely spaced (13 *Ss*). Again, in order to achieve proportional distribution of sexes within the two groups, three *Ss* were eliminated at random from the widely spaced group, resulting in two groups of 10 *Ss* (4 females and 6 males) each.

### Results and Discussion

The analysis of variance of the imitative response data indicated no significant effects of either sex or ordinal position (either independently or in interaction with trial blocks) upon learning the imitative response in the laboratory. The mean total imitation score for oldest and only children (17.00) is considerably higher than the similar scores for middle (11.25) and youngest (12.00) children, but these differences are not statistically significant.

The factorial analysis of variance of total deviation from chance scores indicated no significant effects due to sex of the child, but the effect of ordinal position was significant at the .05 confidence level. Simple *t* tests of the differences between the means for the three groups revealed the greatest magnitude of difference between the mean

of 8.75 for the oldest and only group and the mean of 5.25 for the middle group ( $p < .05$ ). The mean of 6.75 for the group of youngest children falls between the means for the other two groups, and is not significantly different from either. In magnitude, however, it is nearer the mean for the middle group than to that for the first-born group.

Comparison of behavioral scores for widely spaced and closely spaced children with older siblings revealed no significant differences. However, the total deviation from chance imitation scores for these two groups yield some indirect support for the original hypothesis when compared with scores for the first-born group. The mean deviation from chance score for closely spaced children was 5.50, while that for widely spaced children was 7.60. These means, when compared with the corresponding mean score of 8.75 for first-born children, indicate that widely spaced younger siblings are more like first-born children than they are like closely spaced younger siblings. Although the difference between mean scores for closely and widely spaced children is not statistically significant, the difference between mean scores for the first-born children and the closely spaced younger siblings ( $8.75 - 5.50 = 3.25$ ) is significant by *t* test at the .02 confidence level. The mean scores for widely spaced younger children and for first-born children

TABLE 7

SUMMARY OF ANALYSIS OF VARIANCE OF DEVIATION FROM CHANCE IMITATION SCORES BY SEX AND ORDINAL POSITION

Variable	df	ms	F
Sex	1	13.50	2.29
Ordinal Position	2	24.50	4.16*
Sex $\times$ Position	2	10.50	1.78
Within cells error	18	5.89	
Total	23	189.83	

\*  $p < .05$ .



are, in accord with the original hypothesis, not significantly different.

This analysis of behavioral differences in terms of ordinal position in the sibling constellation is based on an assumption that the quality and nature of the parent-child relationship contributes an intervening variable accounting for the observed differences. In order to document such an analysis, one should expect that parents report different practices in interaction with first-born children as compared with subsequent children. Sears et al. (1957, p. 409) have described several differences in maternal practices as a function of the ordinal position of the child under consideration. Restrictions on physical mobility were slightly greater for first-born children, and progressively less for subsequent children. Furthermore, the amount of attention devoted to keeping track of the child was less for middle children than for only, oldest, or youngest children.

With respect to the central variables under consideration here, parental strictness and intrusive overprotection, there are two points of caution to be noted. The division of attention which necessarily accompanies the birth of a second child into a family affects not only the second child but the first as well. It may be true that the second child is unlikely to experience at any time the devotedly protective attention experienced by the only or oldest child. However, it is equally true that the birth of the younger sibling carries with it, in addition to the traumatic loss of this attention, the acquisition of new freedom from such attention, for whatever it might be worth. It is important to consider, then, the relative significance of such autonomous freedom at various stages in the progression of social development. While early learning is in all probability crucial in setting indelible patterns of experienced reinforcement, there may be certain basic skills and responses which are acquired in later development, possibly after the arrival of younger siblings. These later responses may carry equal if not greater import with respect to the eventual achievement of autonomy and

independence. Secondly, the intrinsic effects of transition from being the sole object of parental attention to a position of sharing attention and acquiring autonomy may represent a critical sudden change of reinforcement schedule bearing meaningful implications for the first child's social development.

#### THE GENERALITY OF IMITATIVE BEHAVIOR

The generality of behavioral predispositions in experimental literature is more often implied than stated explicitly. However, in many cases stated principles derived from laboratory observations are extended to encompass more complex forms of behavior without explicit exploration of the generality of the tendency observed in the laboratory. It may be well to recommend a cautious approach to the use of highly sterilized sets of observations in the psychological laboratory as the starting point for speculation about more complex behavioral phenomena.

Miller and Dollard (1941) have not set out to deal with individual differences in tendency toward imitative behavior, nor have they made explicit statements about the generality of laboratory imitative behavior. They have, however, implied that behavioral habits which are highly and consistently rewarded should be displayed in a great variety of situations. If one is to make useful interpretation of laboratory observations such as those in the present study, one must make some attempt to gauge the extent to which the laboratory behavior is typical of behavior in other situations.

The occurrence of "imitative behavior" in commonplace situations can conceivably be gauged by frequency count by observers provided with some explicit and workable definition of the behavior to be noted. The children in the present study, because of their enrollment in a laboratory preschool, were available for such observation over a period of several months. There are, however, some critical difficulties in defining explicitly a situation of imitative behavior corresponding to the specification of imitative behavior in the laboratory. In order to

approximate the conditions of this experimental observation of imitation, a behavioral example must be offered by one individual for potential imitation by the observed individual. Because the frequency with which such examples are offered is not high, and because their occurrence is unpredictable, it would be difficult if not impossible to obtain observational records of such events. It might be assumed, however, that in the absence of offered examples for behavior, the highly imitative (by the laboratory definition) child might overtly seek out information and direction from others.

### Method

In connection with other research conducted in the laboratory preschool, an opportunity for obtaining categorical frequency counts of "dependent" behavior arose (Mann, 1959). Two observers were provided with instructional statements defining a number of categories of behavior assumed to demonstrate dependent interaction between the observed *S* and either his peers or his teachers. The observations were executed on the basis of time samples, with a total of 55 two-minute observations on each *S*. The time samples for any given *S* never covered consecutive time spans, and in all cases they occurred within an interval of five weeks. Because the observations of dependent behavior were not executed for all children enrolled in the preschool, observational measures were available for only 21 of the original 32 *S*s.

The total frequency count of "dependent behavioral acts" included five categories: (I) seeking physical contact; (II) seeking proximity; (III) seeking sympathy, protection, or affection; (IV) seeking approval or companionship; and (V) seeking information. While the total count may be interpreted as an index of generalized tendency to behave in a dependent fashion toward others, the concept of dependency employed in this manner is so broad and inclusive that its interpretation is difficult. Category V, however, is relatively specific in its content, and it generally meets the criteria for a commonplace situational approximation of the kind of imitative behavior observed in the laboratory. Within Category V, three sub-categories of behavior are described: (a) seeking instruction or guidance; (b) seeking assistance in decision making; and (c) general help seeking.

Interobserver agreement for two observers, graduate students of opposite sex, was estimated by comparison of sampled simultaneous observations of the same child. Considering agreements and disagreements regarding the categorization of individual units of observed behavior, an agreement ratio (agreements/total observations) of .91 was obtained.

### Results and Discussion

The product-moment correlation coefficients between observed dependency measures and laboratory measures of imitation are reported in Table 8. The correlations between laboratory imitation and total dependency are greater than those between laboratory imitation and information-seeking dependency, but none of the coefficients is statistically significant. The observational categories as defined here do not appear to relate to the laboratory observations of imitative behavior.

There are without doubt important differences between imitation of peers and imitation of adults. Since the observational measures do not differentiate behavioral units directed toward adults from those directed toward peers, there is a fundamental difference between these measures and the laboratory measures, which deal only with the imitation of adults. While both the laboratory measures and the observational measures probably constitute meaningful data, the absence of any direct relationship between the two should serve to make the researcher cautious in his interpretative generalizations about complex forms of behavior.

### SUMMARY AND INTEGRATION

The data presented here should be assimilated critically. There are clear impli-

TABLE 8  
CORRELATIONS BETWEEN LABORATORY IMITATION  
AND OBSERVED PLAY-ACTIVITY DEPENDENCY  
(Pearson *r*)

Observational Measures	Laboratory Measures	
	Total Imitation	Deviation from Chance Imitation
Total Dependency	-.08	+.37
Information-seeking Dependency (Category V)	-.10	-.15

cations of imprecision in the presently available techniques for assessing parental attitude and practice variables, and there is evidence that generalizations about broadly defined personality phenomena from controlled laboratory observation should be guarded. Furthermore, the number of *Ss* employed was unfortunately, but necessarily, small. An effort was made to recognize such methodological difficulties in both the statistical analysis of the data and the interpretation of the findings. There are nevertheless a number of findings which should be valuable in the execution of future research in related areas.

The basic experiment executed here is concerned with training preschool children to imitate the behavioral response of an adult leader. In spite of an initial tendency to make the response opposite to that of the leader in a two-choice discrimination learning problem, learning did occur over a series of 24 trials in which imitation was reinforced consistently regardless of concomitant environmental cues. Older females and younger males were observed to imitate significantly more often than younger females and older males, and a very slight tendency for older *Ss* to imitate male leaders more often than female leaders proved to be statistically insignificant.

Utilization of the leader's response as a determinant of behavior (either by consistent imitation or consistent nonimitation) over the entire training series was not appreciably different among the eight subgroups studied. However, while the over-all evidence did not indicate that the training series produced general learning to attend to the leader's response as a social cue, the data suggested that training to imitate a male leader operated differently from training to imitate a female leader. The initial tendency to attend to the female leader's response as a behavioral cue was significantly higher than the same tendency to attend to the male leader's response. Furthermore, while training produced no effect in directing attention to the female leader's response, it did bring about direction of attention to the male leader's response as a behavioral cue.

Although a certain portion of the observed intersubject variance in imitation under prescribed laboratory conditions may be accounted for by the age and sex of the *S* and the sex of the imitated leader, there still remains a considerable range of variance among individuals to be ascribed to other operating variables. An investigation of intellectual capacities indicated that intelligence was probably not a crucial variable in this context.

Exploration of child rearing antecedents revealed a general pattern of relationships to imitative behavior in the child. The techniques employed here for assessing parental attitudes and practices yield highly variable and probably contaminated measures, but there is some consistency among the observed relationships between laboratory behavior and both parental attitudes and reported maternal practices. The predisposition to imitate the adult leader directly was related to such antecedent variables in child rearing as parental strictness or nonpermissiveness, maintenance of parental authority over the child, and stringent control of the child's autonomous independence. A recent study of group conformity in the laboratory by Mussen and Kagan (1958), using TAT type projective assessment of characterizations of parents, indicates that extreme conformists tend to perceive their parents as harsh, punitive, restrictive, and rejecting. In the light of these findings, as well as those of other research (Meyers, 1944; Newell, 1936; Radke, 1946; Symonds, 1939), it is conceivable that this perceptual characterization may not be altogether a projective phenomenon, but may largely be an accurate and realistic perception.

In addition, the predisposition to utilize the leader's behavior as a cue for the child's own behavior was related to a set of variables which may be construed as indicating possessive parental intrusion upon the child's independent activity and exploration. The maternal interview scale of the amount of affectionate interaction with the child (II-23) may possibly index a tendency to "baby" the child and to maintain relatively

infantile patterns of relationship with the child. Although it is meaningless to consider correlational indices which may well have arisen by chance, the magnitude of relationship between the deviation from chance imitation measure and certain variables of parent-child interaction suggests that more refined measurement may produce significant findings. Scale III-14 on the maternal interview, which assesses the amount of "play" interaction between the mother and child, correlates +.46 with this measure for boys; Scale III-57, assessing the extent of use of democratic reasoning as a discipline technique, correlates -.45 with the same measure. If one interprets these observations not as conclusive evidence but as worthwhile leads for future research, one is led to the hypothesis that although extensive democratic interaction with the child may bolster his inclination to behave independently, overpossessive "smother love" interaction may interfere with such inclination. An interesting supportive adjunct to such an analysis is provided by the fact that Factor W (Warmth of the mother-child relationship) is correlated -.42 with the deviation from chance imitation scores for the total sample. This coefficient approaches but does not attain the arbitrary .05 significance level ( $p = .08$ ). An inspection of the constitution of this factor reveals that it includes, in addition to scales of affective warmth toward the child, two scales rather directly related to democratic rationality in dealing with the child: the use of reasoning as a technique of discipline (Scale III-57) and administration of verbal reinforcement for appropriate behavior (Scale II-45). These tentative implications suggest that Sears' Factor W (Warmth of the mother-child relationship) and Factor R (Responsible child rearing orientation) could advantageously be subjected to some purification that would set apart measures of restrictive or intrusive interaction from measures of democratic, equalitarian exchange. The factor analytic approach is not likely to contribute to such purification so long as the cross-contamination occurs within individually

defined subscales or at the level of individual response items.

The differences in prediction of behavior for male and female subjects using the child rearing measures employed here are curious. In general, it appears that fairly simple and direct relationships obtain for females but not for males. At least two plausible analyses may account for this discrepancy. It may be that there are meaningful differences between males and females at the stage of development of the present experimental population. While females in this sample have consistently been immersed in a strongly dependent relationship with adults which continues even after the onset of differential training for their eventual adult sex role, the males in the sample are at a stage of development at which differential training for the adult sex role is just beginning. Inasmuch as the dependency-submission issue in social development is one of critical relevance to the differentiation of sex roles, the stage of transition from practically sexless infancy to sex-typed childhood may be a time of some confusion and inconsistency in related areas of behavior. In addition, there is some general evidence of sex differences in the behavior of young children in other areas related to this study. In reviewing a wide range of observations of children's activities, Terman and Tyler (1954) suggest that girls tend to be more "person-oriented" and boys more "thing-oriented." Although there is no data to indicate the age at which such differentiations emerge, it is likely that sex-typed training during the critical period from two to four years of age bears heavily upon the development of such sex differences.

It is particularly interesting that a number of measures related to parental permissiveness were negatively correlated with matched dependent behavior for girls, but positively correlated with such behavior for boys. While none of these inverted correlations for boys were statistically significant, the direction of relationship was consistent for the PARI Factor I scale (Suppression and Interpersonal Distance), the Permissiveness and Punishment for ag-

gression scales on the maternal interview, and the Factor S (Strictness-permissiveness) interview scale. If such relationships were to hold up in future exploration using more refined techniques of measurement, there may be some rather remarkable differences between boys and girls in their response to permissive upbringing.

The observed pattern of relationships between child rearing antecedents and imitative behavior implied by extension that certain differences in imitative tendency as a function of the child's position in the sibling constellation should occur. Experimental data supported the hypothesis that first-born children should be significantly more inclined to imitate the behavior of adults than subsequent children.

An exploration of the generality of the imitative tendencies observed in the laboratory indicated no relationship to a traditional method of assessing dependency in the play activity of children.

While the major contribution of the present findings concerns the importance of two general areas of parent-child interaction (a strictness-permissiveness dimension, and an intrusiveness-overprotectiveness dimension) in determining the tendency for young children to imitate adults, there were other important findings which should offer some guidance in further exploration of the relationships between parent-child interaction and the acquisition of techniques for independent behavior during the course of the child's social development.

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## APPENDIX A

COMPLETE CORRELATIONS BETWEEN PARI SCALES AND LABORATORY IMITATION  
(Pearson  $r$ )

PARI Scale*	Behavioral Measure					
	Total Imitation			Deviation from Chance Imitation		
	Boys	Girls	Total	Boys	Girls	Total
Maternal PARI						
1	+.30	-.01	+.14	+.28	-.27	+.02
2	+.23	-.33	-.01	+.49	-.33	+.21
3	-.19	+.32	+.08	-.13	+.58*	+.17
4	-.31	+.07	-.13	-.33	+.45	+.02
5	+.05	+.24	+.12	+.08	-.02	+.05
6	-.30	-.21	-.21	-.61*	-.30	-.50
7	-.07	+.35	+.13	-.09	+.36	+.13
8	-.13	-.22	-.12	-.42	+.02	-.27
9	-.30	-.10	-.18	-.42	+.35	-.15
10	-.48	+.45	-.05	-.51	+.50	-.13
11	-.30	-.32	-.31	-.33	-.20	-.22
12	-.30	+.52*	+.03	.00	+.57*	+.10
Factor I	+.34	-.04	+.10	+.41	-.51	+.04
Paternal PARI*						
1	+.06	-.35	-.17	+.20	-.32	-.02
2	-.14	-.55*	-.37	+.28	-.60*	-.12
3	-.04	+.20	+.08	-.15	+.24	+.08
4	-.08	+.53*	+.14	-.18	+.46	-.01
5	+.06	-.40	-.15	+.42	-.21	+.17
6	-.05	+.30	+.13	-.22	.00	-.11
7	+.18	-.39	-.15	+.52	-.18	+.15
8	-.13	-.13	-.14	-.24	-.15	-.17
9	-.04	+.20	+.08	-.15	+.24	+.08
10	+.28	+.10	+.16	+.79**	+.18	+.30
11	+.57*	-.12	+.15	-.19	+.65*	+.13
12	+.08	+.07	+.07	+.05	+.31	+.09
Factor I	+.07	-.50	-.24	+.38	-.45	-.01

\*  $p < .05$ .\*\*  $p < .01$ .

\* See text for names of numbered scales.

## APPENDIX B

COMPLETE CORRELATIONS BETWEEN MATERNAL INTERVIEW SCALES AND LABORATORY IMITATION  
(Pearson  $r$ )

Interview Scale <sup>a</sup>	Behavioral Measure					
	Total Imitation			Deviation from Chance Imitation		
	Boys	Girls	Total	Boys	Girls	Total
II-23	.00	+.14	+.06	-.37	+.56*	+.21
II-43	-.20	+.33	+.23	-.42	+.26	-.09
II-45	-.23	+.42	+.21	+.09	+.27	+.35
II-53	+.33	-.24	-.15	+.25	-.35	-.13
II-56	+.48	-.12	.00	+.28	-.46	-.09
II-58	+.47	-.22	-.06	+.20	-.56	-.31
II-61	.00	+.41	+.25	-.37	+.06	-.18
II-62	-.28	+.28	+.07	+.27	-.25	-.17
II-66	-.19	+.27	+.06	-.16	-.33	-.37
II-73	-.43	+.34	-.02	.00	+.22	+.14
III-11	+.47	+.10	+.22	-.31	+.40	+.27
III-13	+.02	-.11	-.05	+.06	-.43	-.18
III-14	-.02	+.17	+.03	+.45	+.19	+.23
III-23	+.13	+.24	+.20	-.07	+.22	+.14
III-30	+.12	-.81**	-.57*	+.27	-.40	-.11
III-31	-.15	+.68**	+.35	-.60	+.24	-.11
III-36	+.29	-.07	+.05	+.20	+.23	+.23
III-47	-.30	-.08	-.18	-.45	-.14	-.29
III-57	+.06	+.03	+.04	-.27	-.41	-.31
Factor S	-.41	+.75**	+.25	-.53	+.65*	+.04
Factor W	-.05	-.29	-.22	-.14	-.52	-.42
Factor R	-.21	-.06	-.12	-.32	-.04	-.21

\*  $p < .05$ .\*\*  $p < .01$ .<sup>a</sup> See text for names of scales.





